WHAT IS CLAIMED IS:

1. An optical scanning lens which is used in a scanning and image forming optical system which gathers a light flux deflected by a light deflector in the vicinity of a surface to be scanned,

wherein:

said lens is formed by a resin having the following properties:

photoelasticity constant $\leq$ 8 ($10^{-13}cm^2$/dyne);

saturation moisture absorption $\leq$ 0.5 (%); and

mold shrinkage coefficient $\geq$ 0.7 (%), and

the following condition is satisfied:

(A) $0 < | \Delta n(x) - \min[\Delta n(x)] | < 34 \times 10^{-5}$

wherein:

$\Delta n(x)$ denotes a refractive-index distribution existing inside said lens, in a range which the light flux passes through, in said lens; and

$\min[\Delta n(x)]$ denotes the minimum value of said $\Delta n(x)$.

2. An optical scanning lens which is used in a scanning and image forming optical system which gathers a light flux deflected by a light deflector in the vicinity of a surface to be scanned,

wherein:

said lens is formed by a resin having the following properties:

photoelasticity constant ≤ 8 (10^{-13}cm^2/dyne);

saturation moisture absorption ≤ 0.5 (%); and

mold shrinkage coefficient ≥ 0.7 (%), and

the following condition is satisfied:

(A) $0 < |\Delta n| < 8.5 \times 10^{-5}$

where, when $\Delta n(x)$ denotes a refractive-index distribution existing inside of said lens, in a range between approximately ±1 mm from a center of the light flux, in a range which the light flux passes through, in said lens, Δn denotes a quadratic coefficient in quadratic least-square approximation of said $\Delta n(x)$.

3. The optical scanning lens as claimed in claim 2, wherein the following condition is satisfied

(B) $0 < |\Delta n| < 8.5 \times 10^{-5}$

where, when $\Delta n(x)$ denotes a refractive-index distribution existing inside said lens, in a range between approximately ±1 mm from a center of the light flux, in a range which the light flux passes through, in said lens, Δn denotes a coefficient of second order in second-order least-square approximation of said $\Delta n(x)$.

4. An optical scanning lens which is used in a scanning and image forming optical system which gathers a light flux deflected by a light deflector in the vicinity of a surface to be scanned,

wherein:

said lens is formed by a resin having the following properties:

photoelasticity constant $\leq$ 8 ($10^{-13}cm^2$/dyne);

saturation moisture absorption $\leq$ 0.5 (%); and

mold shrinkage coefficient $\geq$ 0.7 (%), and

the following condition is satisfied:

(A) $0.4 \times 10^5 < | \Delta n(x) - \min[\Delta n(x)] | < 16 \times 10^{-5}$

where:

$\Delta n(x)$ denotes a refractive-index distribution existing inside said lens, in a range which the light flux passes through, in said lens; and

$\min[\Delta n(x)]$ denotes the minimum value of said $\Delta n(x)$.

5. An optical scanning lens which is used in a scanning and image forming optical system which gathers a light flux deflected by a light deflector in the vicinity of a surface to be scanned,

wherein:

said lens is formed by a resin having the following properties:

photoelasticity constant $\leq$ 8 ($10^{-13}cm^2$/dyne);

saturation moisture absorption $\leq$ 0.5 (%); and

mold shrinkage coefficient $\geq$ 0.7 (%), and

the following condition is satisfied:

(A) $0.1 \times 10^{-5} < | \Delta n | < 4.0 \times 10^{-5}$

where, when $\Delta n(x)$ denotes a refractive-index distribution existing inside of said lens, in a range between approximately ±1 mm from a center of the light flux, in a range which the light flux passes through, in said lens, Δn denotes a quadratic coefficient in quadratic least-square approximation of said $\Delta n(x)$.

6. The optical scanning lens as claimed in claim 5, wherein the following condition is satisfied

(B) $0.1 \times 10^{-5} < | \Delta n | < 4.0 \times 10^{-5}$

where, when $\Delta n(x)$ denotes a refractive-index distribution existing inside said lens, in a range between approximately ±1 mm from a center of the light flux, in a range which the light flux passes through, in said lens, Δn denotes a coefficient of second order in second-order least-square approximation of said $\Delta n(x)$.

7. An optical scanning device which deflects a light flux from a light source, gathers the deflected light flux on a surface to be scanned by a scanning and image forming optical system as a beam spot, and performs optical scanning of said surface to be scanned,

wherein the optical scanning lens as claimed in claim 1 is mounted as an optical scanning lens used in said scanning and image forming optical system.

8. An optical scanning device which deflects a light flux from a light source, gathers the deflected light flux on a surface to be scanned by a scanning and image forming optical system as a beam spot, and performs optical scanning of said surface to be scanned,

wherein the optical scanning lens as claimed in claim 2 is mounted as an optical scanning lens used in said scanning and image forming optical system.

9. An optical scanning device which deflects a light flux from a light source, gathers the deflected light flux on a surface to be scanned by a scanning and image forming optical system as a beam spot, and performs optical scanning of said surface to be scanned,

wherein the optical scanning lens as claimed in claim 3 is mounted as an optical scanning lens used in said scanning and image forming optical system.

10. An optical scanning device which deflects a light flux from a light source, gathers the deflected light flux on a surface to be scanned by a scanning and image forming optical system as a beam spot, and performs optical scanning of said surface to be scanned,

wherein the optical scanning lens as claimed in claim 4 is mounted as an optical scanning lens used in said scanning and image forming optical system.

11. An optical scanning device which deflects a light flux from a light source, gathers the deflected light flux on a surface to be scanned by a scanning and image forming optical system as a beam spot, and performs optical scanning of said surface to be scanned,

wherein the optical scanning lens as claimed in claim 5 is mounted as an optical scanning lens used in said scanning and image forming optical system.

12. An optical scanning device which deflects a light flux from a light source, gathers the deflected light flux on a surface to be scanned by a scanning and image forming optical system as a beam spot, and performs optical scanning of said surface to be scanned,

wherein the optical scanning lens as claimed in claim 6 is mounted as an optical scanning lens used in said scanning and image forming optical system.

13. The optical scanning device as claimed in claim 7 comprising a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

14. The optical scanning device as claimed in claim 8 comprising a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

15. The optical scanning device as claimed in claim 9 comprising a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

16. The optical scanning device as claimed in claim 10 comprising a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

17. The optical scanning device as claimed in claim 11 comprising a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

18. The optical scanning device as claimed in claim 12 comprising a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

19. The optical scanning device as claimed in claim 13 wherein an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

20. The optical scanning device as claimed in claim 14 wherein an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

21. The optical scanning device as claimed in claim 15 wherein an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

22. The optical scanning device as claimed in claim 16 wherein an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of

said light deflector, said image being like approximately a line long in main scanning directions.

23. The optical scanning device as claimed in claim 17 wherein an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

24. The optical scanning device as claimed in claim 18 wherein an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

25. An image forming apparatus which performs optical scanning of a photosensitive surface of an image carrying body and thereby forms a latent image thereon, develops the latent image and thereby visualizes it,

wherein the optical scanning device as claimed in claim 7 is mounted as an optical scanning device which performs the optical scanning of the photosensitive surface of said image carrying body as the surface to be scanned.

26. An image forming apparatus which performs optical scanning of a photosensitive surface of an image carrying body

and thereby forms a latent image thereon, develops the latent image and thereby visualizes it,

wherein the optical scanning device as claimed in claim 8 is mounted as an optical scanning device which performs the optical scanning of the photosensitive surface of said image carrying body as the surface to be scanned.

27. An image forming apparatus which performs optical scanning of a photosensitive surface of an image carrying body and thereby forms a latent image thereon, develops the latent image and thereby visualizes it,

wherein the optical scanning device as claimed in claim 9 is mounted as an optical scanning device which performs the optical scanning of the photosensitive surface of said image carrying body as the surface to be scanned.

28. An image forming apparatus which performs optical scanning of a photosensitive surface of an image carrying body and thereby forms a latent image thereon, develops the latent image and thereby visualizes it,

wherein the optical scanning device as claimed in claim 10 is mounted as an optical scanning device which performs the optical scanning of the photosensitive surface of said image carrying body as the surface to be scanned.

29. An image forming apparatus which performs optical scanning of a photosensitive surface of an image carrying body and thereby forms a latent image thereon, develops the latent image and thereby visualizes it,

wherein the optical scanning device as claimed in claim 11 is mounted as an optical scanning device which performs the optical scanning of the photosensitive surface of said image carrying body as the surface to be scanned.

30. An image forming apparatus which performs optical scanning of a photosensitive surface of an image carrying body and thereby forms a latent image thereon, develops the latent image and thereby visualizes it,

wherein the optical scanning device as claimed in claim 12 is mounted as an optical scanning device which performs the optical scanning of the photosensitive surface of said image carrying body as the surface to be scanned.

31. The image forming apparatus as claimed in claim 25,

wherein said optical scanning device comprises a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

32. The image forming apparatus as claimed in claim 26, wherein said optical scanning device comprises a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

33. The image forming apparatus as claimed in claim 27,

wherein said optical scanning device comprises a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

34. The image forming apparatus as claimed in claim 28,

wherein said optical scanning device comprises a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

35. The image forming apparatus as claimed in claim 29,

wherein said optical scanning device comprises a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

36. The image forming apparatus as claimed in claim 30,

wherein said optical scanning device comprises a light deflector which deflects the light flux from the light source,

wherein:

said light deflector has a deflection reflecting surface and deflects the light flux at a uniform angular velocity; and

said optical scanning lens has a function of causing the scanning of said surface to be scanned to be performed at a uniform velocity.

37. The image forming apparatus as claimed in claim 31 wherein, in said optical scanning device, an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

38. The image forming apparatus as claimed in claim 32 wherein, in said optical scanning device, an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

39. The image forming apparatus as claimed in claim 33 wherein, in said optical scanning device, an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

40. The image forming apparatus as claimed in claim 34 wherein, in said optical scanning device, an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

41. The image forming apparatus as claimed in claim 35 wherein, in said optical scanning device, an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

42. The image forming apparatus as claimed in claim 36 wherein, in said optical scanning device, an image is formed from the light flux from the light source in the vicinity of the deflection reflecting surface of said light deflector, said image being like approximately a line long in main scanning directions.

43. The image forming apparatus as claimed in claim 25, wherein said image carrying body is a photoconductive photosensitive body,

after the photosensitive surface being charged uniformly, an electrostatic latent image being formed thereon by the optical scanning,

the thus-formed electrostatic latent image being developed so that a toner image is obtained, and

the thus-obtained toner image being transferred and fixed onto a sheet-like recording medium.

44. The image forming apparatus as claimed in claim 26, wherein said image carrying body is a photoconductive photosensitive body,

after the photosensitive surface being charged uniformly, an electrostatic latent image being formed thereon by the optical scanning,

the thus-formed electrostatic latent image being developed so that a toner image is obtained, and

the thus-obtained toner image being transferred and fixed onto a sheet-like recording medium.

45. The image forming apparatus as claimed in claim 27, wherein said image carrying body is a photoconductive photosensitive body,

after the photosensitive surface being charged uniformly, an electrostatic latent image being formed thereon by the optical scanning,

the thus-formed electrostatic latent image being developed so that a toner image is obtained, and

the thus-obtained toner image being transferred and fixed onto a sheet-like recording medium.

46. The image forming apparatus as claimed in claim 28, wherein said image carrying body is a photoconductive photosensitive body,

after the photosensitive surface being charged uniformly, an electrostatic latent image being formed thereon by the optical scanning,

the thus-formed electrostatic latent image being developed so that a toner image is obtained, and

the thus-obtained toner image being transferred and fixed onto a sheet-like recording medium.

47. The image forming apparatus as claimed in claim 29, wherein said image carrying body is a photoconductive photosensitive body,

after the photosensitive surface being charged uniformly, an electrostatic latent image being formed thereon by the optical scanning,

the thus-formed electrostatic latent image being developed so that a toner image is obtained, and

the thus-obtained toner image being transferred and fixed onto a sheet-like recording medium.

48. The image forming apparatus as claimed in claim 30, wherein said image carrying body is a photoconductive photosensitive body,

after the photosensitive surface being charged uniformly, an electrostatic latent image being formed thereon by the optical scanning,

the thus-formed electrostatic latent image being developed so that a toner image is obtained, and

the thus-obtained toner image being transferred and fixed onto a sheet-like recording medium.

49. An optical scanning lens which is used in a scanning and image forming optical system which gathers a light flux deflected by a light deflector in the vicinity of a surface to be scanned,

wherein:

said lens is formed by a resin having the following properties:

photoelasticity constant $\leq$ 8 ($10^{-13}cm^2$/dyne);

saturation moisture absorption $\leq$ 0.5 (%); and

mold shrinkage coefficient $\geq$ 0.7 (%), and

the following condition is satisfied:

$1.487 \times d^2 / \lambda \geq \{\beta / (\beta - 1) \cdot L\}^2 \cdot (2 \cdot \Delta n \cdot t)$,

where:

d denotes a beam diameter defined by 1/e2 the peak intensity thereof;

λ denotes a wavelength;

β denotes a lateral magnification of said lens;

L denotes a distance between the deflection surface of the optical deflector and the surface to be scanned; and

Δn denotes a quadratic coefficient of refractive-index distribution approximated from $\Delta n(x)$ by a least squares method in quadratic formula, where $\Delta n(x)$ denotes a refractive-index distribution existing in said lens in a range of approximately ± 1 mm from the center of the light flux within a region which the light flux passes through, in said lens; and

t denotes a thickness of said lens.

50. The optical scanning lens as claimed in claim 49, wherein said lens is molded by using a metal die.

51. The optical scanning lens as claimed in claim 49, wherein said resin comprises a polyolefin resin.

52. An optical scanning device which deflects a light flux from a light source, gathers the deflected light flux on a surface to be scanned by a scanning and image forming optical system as a beam spot,

wherein the optical scanning lens claimed in claim 49 is applied in said scanning and image forming optical system.

53. An image forming apparatus which performs optical scanning of a photosensitive surface of an image carrying body and thereby forms a latent image thereon,

wherein the optical scanning device claimed in claim 52 is mounted as an optical scanning device which performs the optical scanning of the photosensitive surface of said image carrying body as the surface to be scanned.